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A Comparison of Cottonseed Meal, Cottonseed Meal and Tankage, Peanut Oil Meal, and Soybean Oil Meal, Fed with Corn Silage for Fattening Two-Year-Old Steers

University of Tennessee Agricultural Experiment Station

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THE UNIVERSITY OF TENNESSEE
AGRICULTURAL EXPERIMENT STATION

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By

M. JACOB AND H. R. DUNCAN

Two-year-old steers, used in 1937-38 test, as they appeared just before going into the barn for preliminary feeding.

KNOXVILLE, TENNESSEE

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A COMPARISON OF COTTONSEED MEAL, COTTONSEED MEAL AND TANKAGE, PEANUT OIL MEAL, AND SOYBEAN OIL MEAL, FED WITH CORN SILAGE FOR FATTENING TWO-YEAR-OLD STEERS

By

M. JACOB AND H. R. DUNCAN

INTRODUCTION

In recent years the production of peanuts and soybeans has increased rapidly in this country. The increase in peanut production took place entirely in the South, while the major increase in soybean production occurred in the Cornbelt states, Illinois leading. The surplus of these oil-bearing seeds have been crushed for their valuable oils, and the cakes or meals produced by the oil mills have become available, in increasing quantities, for feeding purposes.

TABLE 1—*Trends in the production of cottonseed meal, peanut oil meal, and soybean oil meal in the United States*

Year	Cottonseed meal or cake produced	Soybeans crushed	Peanuts crushed
	Tons	Tons	Tons
1925	2,597,000	[1]10,520	34,167
1935	[2]1,739.000	272,754	110,140

[1]The production of soybean oil meal is equivalent to 80 percent of the raw seed.

[2]The production of cottonseed meal is greater now than in 1935, and varies considerably from year to year.

These new meals have about the same analyses as 41 percent cottonseed meal, the kind most commonly used for feeding, with the exception that they run 2 or 3 percent higher in protein. The proteins of these legumes, peanuts and soybeans, are of better quality and stimulate somewhat better growth in some animals than the proteins in cottonseed meal.

These meals have become available in Tennessee markets, frequently at the same price per ton as cottonseed meal, and feeders have been asking about their relative merits.

Investigations during recent years have shown that the proteins in feeds of animal origin, such as milk, fish meal, and tankage, have a much higher value per unit of protein, for producing growth in some animals, than the proteins of plant origin. These feeds are very efficient for swine and poultry. Cattle have not responded to any great degree, although, in some cases, the addition of an animal protein to the ration has improved the gains and finish.

OBJECTS OF THE EXPERIMENT

The objects of this experiment were:

1. To compare peanut and soybean oil meals with cottonseed meal when each is fed in the same amount with silage for fattening 2-year-old steers.

2. To compare a mixture of cottonseed meal, 3 parts by weight, and high-grade 60 percent tankage, 1 part by weight, with cottonseed meal when each is fed in the same amount with silage for fattening 2-year-old steers.

PLAN OF THE EXPERIMENT

EQUIPMENT AND MANAGEMENT

The 4 lots of steers were fed in a well-ventilated barn. Each lot, consisting of 7 steers, occupied a stall of approximately 25 by 14 feet. A constant supply of fresh water was maintained in a concrete tank located in the stall. The cattle were kept in the stalls for the entire feeding period, except on weighing days, when they were out for a few minutes. This was done to conserve all the manure and to facilitate gains. They were comfortably bedded with straw and shavings. Salt was kept before each lot of cattle.

CATTLE USED

A total of 84 cattle were used during the three years of the experiment—1935-36, 1936-37, and 1937-38. They were native steers, showing a predominance of Angus, Hereford, or Shorthorn breeding. Some of them carried their breed characteristics to a marked degree, but most of them were grades or crosses, as indicated by their mottled faces and mixed colors. They were 2-year-old cattle, grading medium to choice as feeders, and carrying about the amount of fat one would expect on cattle of this age coming off East Tennessee grass in October.

RATIONS FED

Lot 1—Silage and cottonseed meal.

Lot 2—Silage and a mixture of 3 parts, by weight, of cottonseed meal and 1 part, by weight, of high-grade 60 percent tankage.

Lot 3—Silage and peanut oil meal.

Lot 4—Silage and soybean oil meal.

The amount of silage fed was the same for each lot, being governed by the lot consuming the least. The silage contained only a reasonable amount of ears.

The concentrates were fed as follows:

3 pounds per head per day the first month
4 pounds per head per day the second month
5 pounds per head per day the third month
6 pounds per head per day the fourth month
7 pounds per head per day the last 20 days

The above amounts of these high-protein feeds were more than enough to balance the rations. This rate of feeding, however, has given good results in the past at our Experiment Stations, and is further justified by the fact that cottonseed meal is often cheaper, pound for pound, than corn, and that the manure produced is much richer in nitrogen, phosphorus, and potassium than that produced from cattle fed the same amounts of corn.

These concentrates were compared on a pound-for-pound basis, as it was impossible to get these feeds with the same protein content each year.

TABLE 2—*Average analyses of the concentrates used*

Concentrate	Protein	N-free extract	Fiber	Fat
	Percent	Percent	Percent	Percent
Cottonseed meal.....	41	24	12	5
Peanut oil meal.....	43+	25	10	6
Soybean oil meal.....	43	29	7	2
Tankage.....	60	0	8	5

The day's ration was divided into two equal parts, one being fed in the morning and the other at night.

A preliminary feed, for about two weeks, was given each lot of cattle before the feeding period proper began, in order to accustom the cattle to their feeds and quarters.

WEIGHING

Each steer was identified by means of ear labels and was weighed on 3 consecutive days at the beginning and at the end of each 30-day period. The average of the 3 weights was taken as the weight for that period.

SUMMARY OF THREE YEARS' RESULTS

Carcass data were obtained the first year. The final experimental weights and the chilled weights of the carcasses being used as bases for calculation, these cattle dressed 56.4 percent. The final weight was taken after the morning feed and water. Had the cattle been kept off water during the night and weighed early without feed, as is customary in selling, the dressing percentage would have been considerably higher. The cattle used the second and third years finished as well as those fed the first year, or better. They were good enough to be considered rather "toppy" cattle for the Knoxville market and were satisfactory for the best trade.

TABLE 3—*Rations*

Item	Lot 1	Lot 2	Lot 3	Lot 4
	Pounds	Pounds	Pounds	Pounds
Average daily ration for 140-day period:				
Silage	44.7	44.7	44.5	44.7
Cottonseed meal	4.86			
Cottonseed meal 3 parts; tankage 1 part		4.86		
Peanut oil meal			4.86	
Soybean oil meal				4.86
Salt	.076	.090	.085	.064

TABLE 4—*Weights and gains*

Item	Lot 1	Lot 2	Lot 3	Lot 4
Average number of steers per lot	7	7	7	7
Average number of days in experiment	140	140	140	140
	Pounds	Pounds	Pounds	Pounds
Average initial weight	873.7	871.9	871.2	875.2
Average weight at end of 140 days	1126.1	1125.1	1114.1	1130.3
Average gain per steer	252.4	253.2	242.9	255.1
Average daily gain per steer	1.800	1.808	1.735	1.822

TABLE 5—*Cost and feed requirements for 100-pounds gain*

Item	Lot 1	Lot 2	Lot 3	Lot 4
Average cost of 100-pounds gain	$9.44	$10.51	$10.53	$10.16
Average feed requirements for 100-pounds gain	Pounds	Pounds	Pounds	Pounds
Silage	2482.0	2474.0	2563.0	2456.0
Cottonseed meal	270.0			
Cottonseed meal 3 parts; tankage 1 part		269.2		
Peanut oil meal			280.5	
Soybean oil meal				267.1
Salt	4.2	4.8	4.9	3.5

TABLE 6—*Financial statement*

Item	Lot 1	Lot 2	Lot 3	Lot 4
Average initial cost per head @ $6.57	$57.44	$57.31	$57.28	$57.84
Average feed cost per head	23.83	26.61	25.59	25.92
Average total cost (initial and feed) per head	81.27	83.92	82.87	83.76
Average necessary selling price to break even (final weight less 3% basis), exclusive of pre-experimental and post-experimental feeding	7.44	7.69	7.66	7.64
Necessary margin (exclusive of pre-experimental and post-experimental feeding)	.87	1.12	1.09	1.07

Knoxville average feed prices: Cottonseed meal, $28.66 per ton; cottonseed meal 3 parts and tankage 1 part, $36.75 per ton; peanut oil meal, $34.00 per ton; soybean oil meal, $34.83 per ton; silage, $4.46 per ton.

CONCLUSIONS

1. Peanut oil meal was somewhat less efficient in producing gains than the other supplements. The cattle fed peanut oil meal had less keen appetites and were off feed more frequently.

2. The use of tankage, which increased the amount of protein fed, as well as adding an animal protein, did not increase gains. Some difficulty was experienced in getting these tankage-fed lots of cattle on feed; but once on feed, they generally licked the trough clean.

3. Cottonseed meal made a much better showing in cost of gains and financial outcome than the other supplements. Peanut and soybean oil meals cost from $2.00 to $10.00 more per ton than cottonseed meal of approximately the same protein content. The addition of tankage also raised the cost of gain and consequently lowered returns.

4. The 4 concentrates fed were practically equal, pound for pound, in feeding value. The price per ton should be the deciding factor in choosing among them. In most cases the cottonseed meal-tankage combination will be eliminated on a cost-per-ton basis.

5. Satisfactory slaughter cattle were produced by each ration fed. Cattle fleshy at the start of the experiment finished as good or low choice beeves.